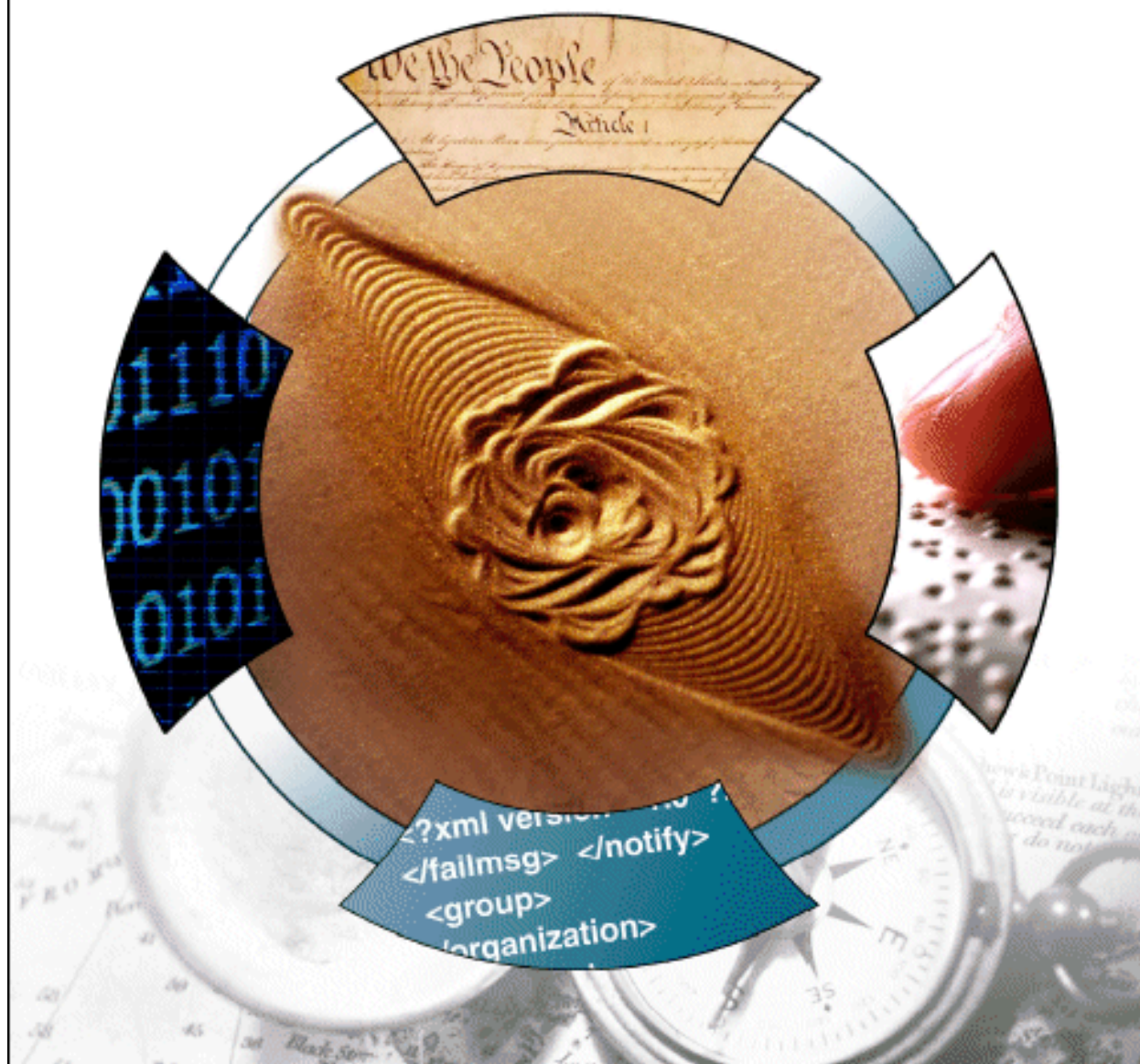




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Extending Digital Dividends: Public Goods and Services that Work for All



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The Federal Architecture and Infrastructure Committee (FAIC) of the CIO Council

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Resources

(Inside front cover)

"Information is the currency of democracy." —Thomas Jefferson

American government must communicate with all of us. This is true for regional weather warnings and local hurricane evacuations, state tax collection, and the federal census count. "Market share" that would make a soft drink maker ecstatic is simply unacceptable. And "customer satisfaction," measured only in our existing customers, is at best a partial measure of success. To reach America's large, diverse population, all government must stay at the forefront of communication technology in every age.

After 2000 years of evolution, the English alphabet was completed by Norman scribes who added "W," the 26th letter. English braille notation, with its 63 characters, was adopted as a standard a century after Louis Braille's invention. The American Standard Code for Information Interchange (ASCII), with room for 128 characters, was published 30 years ago after only a decade's work. ASCII text translates the ones and zeros used by computers to and from the language we use, without error and at astounding speeds.

The need to improve human communication did not stop there. The Internet's capacity requires structuring information, not merely denoting it. To capture and present this structured information—also known as knowledge—we have gone from Hypertext Markup Language (HTML) to eXtensible Markup Language (XML) and even to Voice Markup Language (VML) in an historical heartbeat.

Standards from the alphabet to XML increase the efficiency and effectiveness of information transfer. Braille, with its raised dots, is an appallingly expensive and inefficient way to communicate. It is also very linear. In the 1930's the American Federation for the Blind invented the Talking Book—a great improvement, but still linear.

This year, using a new proposed standard, the American Federation for the Blind and TimeWarner Talking Books released an audio eBook on CD, *A Call to Conscience: The Landmark Speeches of Dr. Martin Luther King, Jr.* Please download Dr. King's "I Have a Dream" speech in this new format at www.twbookmark.com/audiobooks/mlk/demo.html. You will see the familiar words as text on screen or in braille, synchronized with the narrator's voice. You can navigate forward and backward in the speech using computer keystrokes. We have gone from standardizing the alphabet to standardizing book formats.

Driven by necessity, the blind are leading us.

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***The picture on the cover is the "Earthquake Rose," a record in sand of an earthquake that shook Port Townsend, Washington, on February 28th, 2001. What had been a familiar pendulum image was transformed into a new thing of beauty because an outside force—the earthquake—shook the pendulum on its path.***

Government has long sought to bring to all Americans the information they need to improve their lives and their communities. Our familiar paths are being challenged, both by the information revolution and by our increasing knowledge of how to communicate with every American. This guide is an attempt to present a glimpse of the methods now emerging to meet these needs. We hope you will share the vision.

(inside back cover)  
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## Executive Summary

The Internet and other information and communication technologies are rapidly changing the way we work, learn, communicate with each other, and conduct government. Societies around the world are embracing and “bracing for” the myriad consequences and challenges posed by this growing network of individual knowledge makers and traders. Businesses scramble to use the Internet to increase productivity, boost exports, and forge closer relationships with customers and suppliers. Increasingly as businesses cope with a corporate workforce located around the globe and dealing directly with millions of customers around the globe, they realize that the value of communication skills probably surpasses all others.

The Federal Government similarly seeks to create improvements in its communications capabilities throughout its organizations by taking a citizen-centric approach. This e-government approach is focused on unifying islands of automation and simplifying business processes to create an unbroken “information value chain.”

The impetus behind the push towards e-government is simple. Governments, like businesses, believe that well-conceived services using the multiple delivery channels of the Internet are the best way to meet agency missions. In addition, the growing use of interactive communication technologies used in market research and collaborative work makes it possible to communicate directly with people with disabilities, senior citizens, and members of immigrant or isolated groups to foreclose on access disparities due to inadequate designs. In addition, it is likely that the newly established Homeland Security Office will benefit greatly from these collaboration tools in its efforts to “fine tune” communications among Federal, State, and local law enforcement and medical communities

The most publicly visible metric for e-government success will be enfranchising all who want the opportunity to be involved in local civic life in spite of a handicapping condition such as age, disability, or a previously isolating difference. But the ultimate success of electronic government depends on the ability of *all* Americans to take full advantage of the opportunities offered by the government. A sound e-government course will tip the market balance toward more commercial offerings available to government and other organizations that are designed for use by all people. As the Internet shifts from presenting static information to dynamic and service-oriented applications, Federal organizations that form active learning partnerships with state and community leaders will tap the power of a citizen-centric approach.

This guide presents an emerging perspective of citizen-centric government as driver for sound and timely implementation of three promising enterprise tools: 1) voice application networks, 2) eXtensible Markup Language (XML), and 3) networked improvement communities through collaborative Web space and face to face meetings. Taken together, these tools and the corresponding state and local partnership forums used to implement them will generate the conditions needed for expanded civic and digital opportunities that meet public expectations for access and equity. Today the unprecedented convergence of technologies only raises the possibilities. Collaborations forged to extend digital dividends to all Americans by local and federal participants will increase the net value to society of public information by an order of magnitude.

# 1. Overview

The Federal Architecture and Infrastructure Committee (FAIC) of the CIO Council has developed this guide, *Extending Digital Dividends: Public Goods and Services that Work for All*, as a first step in assisting public administrators in improving government-wide program delivery decisions. The guide is designed to raise awareness of technological opportunities for spanning the digital divide. These opportunities are presented in light of those segments of the American population that are currently most underserved in terms of participating in a citizen-centered e-government. To that end, the guide undertakes the following activities:

- Identifies those demographic groups that are disproportionately underserved by e-government and, in an effort to cultivate intervention strategies, presents information on the addressable issues that cut across those underserved markets;
- Provides exemplars of successful e-government efforts to minimize digital disparities;
- Highlights how eXtensible Markup Language (XML) and its variants could enable Federal agencies to improve the delivery of government goods and services through information repurpose and reuse strategies;
- Provides background and reference information on technology enhancements such as voice application networks and networked improvement communities that are poised to offer forward-looking Federal programs the greatest value as they move to a more citizen-centered e-government; and
- Identifies ways for public administrators to implement XML and the other emerging technologies as the Federal Government sets into motion the transformation of a government centered around customer needs.

## 2. Introduction: Toward Citizen-Centric Government

The principles of government openness, equity, and accountability are inherent in the democratic ideal—an informed citizenry is essential to the democratic process. The more the American people know about themselves in society, mediated by government, the better they will be governed and served. This philosophy underlies the activities of most Federal agencies through existing public information access requirements in individual agency authorizing statutes. Both Congress and the President have reinforced the importance of public information in recent years through such mandates as the Government Paperwork Elimination Act, the promulgation of information technology procurement standards under Section 508 of the Rehabilitation Act, and the Administration's vision of e-government. In fact, government's very success is measured in its ability to provide timely and useful information and services to all citizens. This performance measure is derived from several factors, some of which grow out of Congressional statutes or Administrative mandates, but all of which support the ideal that an informed public is necessary to a healthy democracy.

**E-government** is one of the five key elements in the President's Management and Performance Plan. As highlighted in Office of Management and Budget Memorandum 01-28<sup>1</sup>, the focus of current e-government initiatives is on reforming the government so that it is results oriented, market based, and citizen centered. The plan calls for linking the current "islands of automation" that make it difficult to access and derive the value of information contained in disparate databases. Business processes must be simplified and unified to maximize the benefits of using information technology. The power e-government holds to transform the delivery of goods and services for the public is profound. The ultimate success of e-government depends on the ability of *all* people to take advantage of the opportunities offered by the government. Information provided electronically to only a portion of the public will not gain public acceptance if that same information cannot be made accessible to all citizens.

**Section 508** of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794d) generally requires Federal agencies to ensure that procurement of electronic and information technology (EIT) takes into account the needs of all people, including people with disabilities. Doing so enhances the ability of Federal employees with disabilities to have access to and use of information and data that is comparable to that provided to others. Similarly, agency procurement of accessible EIT enhances the ability of members of the public with disabilities who are seeking information or services from a Federal agency to have access to and use of information and data that is comparable to that provided to others. The Federal Acquisition Requirements (FAR) were modified in 2001 to address this agency requirement. The standards became enforceable on June 21, 2001.

**The Government Paperwork Elimination Act (GPEA)**, P. L. 105-277, is another important tool to improve customer service and government efficiency through the use of information technology. GPEA requires Federal agencies, by October 21, 2003, to allow individuals or entities the option to submit information or transact with agencies electronically, when practicable, and to maintain records electronically, when practicable.

These policies taken together, along with the changing communications opportunities afforded by technology, provide today's urgency toward better understanding how to improve delivery of services to underserved groups.

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<sup>1</sup> See <http://www.whitehouse.gov/omb/memoranda/m01-28.html>.



### 3. Communications for a Connected Society

The means by which Americans communicate with one another, either on the job or in their personal lives, are changing. Traditional methods of communicating in person, by phone or by letter, are expanding with Internet options. Previously remote or unavailable information is at hand. For example, architects are now engaging a broader base of stakeholders more easily as they begin to use the Internet for two-way communication of visual and spatial ideas with public officials, clients, building users and ordinary citizens. In all economic growth and development activities, the opportunity exists to communicate and exchange information more effectively with more people. This collaborative approach was the winning formula practiced by the universities, scientists, and government officials who created the Internet over thirty years ago.

#### Mutual, Two-way Communications

Community-building defines our national character for relating to one another as observed by de Tocqueville—

*"Americans of all ages, all conditions, and all dispositions constantly form associations.  
...In democratic countries the science of association is the mother of science;  
the progress of all the rest depends on the progress it has made."*

This drive to associate is also reflected in the introduction to the 1999 handbook entitled, *The Local News Handbook*, published by the Readership Issues Committee of the American Society of Newspaper Editors—

*"When our readers and potential readers tell us, over and over, that they want more news,  
and more local news, they are saying they want information and help to live better,  
they want to know what is going on around them and  
they want to be a part of a community."*

A community-building role for individuals continues to be discussed throughout their handbook. One recommendation for news editors is to better understand local issues through research into government demographics and other data—to “tell the story” of the community through civic “mapping” exercises. The report outlines ten dimensions of local news. This is worth reviewing in light of citizen-centric expectations in a public information infrastructure.

#### Ten Dimensions of Local News that Matter

Proximity. Readers appreciate news about their immediate community.

Safety. People want to be safe in their communities and in their homes.

Utility. Successful media products conform to the users' daily activities and help advance them.

Government. Citizens want to be engaged, to be more than bystanders in civic life.

Education. Interest and participation in improving local schools is pervasive and growing.

Spirituality. Not just resources for values and ethics, churches, synagogues and mosques are important assistance centers.

Support. Americans volunteer in unprecedented numbers with various organizations.

Identity. People want to be part of a community.

Recognition. Media confirms affirmation of high honor.

Empowerment. Americans thrive on mobilizing and organizing—it's part of our character.

The most important hurdle is whether the information products being developed actually have demonstrable impact in real-life communities. As people have access to more information, expectations are raised regarding the quality of the content, as well its accessibility. In fact, as shown in recent reports<sup>2</sup>, the public places a high value on e-government's ability to hold the Federal government accountable, a fact that is not likely to change as Internet usage continues to increase.

### Bridging Islands of Data Automation and Individual Separation

For much of their understanding about utilizing Internet-based technologies to improve service delivery, governments can look to businesses. Businesses know that the loyalty of valuable customers must be continually earned. Knowing how to focus on targeted market segments is key to how services are sold. Armed with this knowledge from business practices, governments are halfway toward charting a sound course.

For the remaining points on the socioeconomic compass, however, governments must work harder. They must turn to the best practices of public management. How can all people be served, not just those that represent targeted, profitable markets? The U.S. Census is an important resource for gleaning the needs of those not normally targeted by businesses and marketing plans. The 2000 Census is expected to reveal that these citizens are growing at a faster rate than "mainstream" market segments. Non-mainstream groups include people with disabilities, people over 50, and people with English or technical literacy deficits due to immigration or cultural isolation from mainstream opportunities. Although outpacing the growth rates of other demographic groups, these groups have broadly been identified as least likely to be using the Internet. Limited income frequently increased the likelihood that these groups will not use the Internet.

This is where the comparative mapping of government as business falls short. The short-term profit-optimizing strategies of business diverge from public service strategies. Businesses can choose to operate exclusively in new Internet space, and market exclusively to preferred customers. Governments cannot.

### Extending Digital Dividends by 360°

So what is the "digital divide?" The divide arises out of the unprecedented rate of adoption and reliance on digital methods of communication in society. This rapid societal dependence, by historical terms, is outpacing electronic communications use by individuals and groups whose societal network ties may already be weak. Additional factors that constrain opportunity to join this burgeoning social network include technical designs that restrict usefulness by people with disabilities, cost and complexity, and reading/technical literacy.

But the societal divide has been compounded by acceptance of digital content methods that partition public information on disconnected "islands of automation." Information formatted for one media or platform cannot necessarily convert to another.

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<sup>2</sup> "E-Government: The Next American Revolution," prepared by Hart-Teeter for the Council for Excellence in Government, September 2000.

Without the public value derived from widespread availability or “network effects”, this partitioned public information remains costly to maintain for the few who can use it. Disconnected data management approaches raise individual access thresholds significantly. Individuals and associations require greater time, technical skills and equipment costs to span the “data islands”. Without sufficient planning, members of a community who find reliance on the Internet to be unsatisfactory, inconvenient, unaffordable, or unavailable will not have adequate alternatives to access vital public information developed for their own city or region.

Ironically, people anywhere in the 24/7 Internet-connected world have easy access to such local information, even though local citizens down the street without Internet connections would not. Communities cannot afford to unbalance their localities by stranding in the 9 to 5 world citizens with the weakest time and transportation alternatives for conducting business. The advantages of public information and services available around the clock from one’s home must accrue to all. Creativity and commitment are needed.

But just as the Internet breaks boundaries of time and distance, it breaks boundaries of conventional thinking. Creative pioneers from the previously almost invisible communities of people with disabilities, older people, and people with education or cultural-related literacy deficits are carefully blending the best of the old, familiar ways of communicating with new ways. Needed creativity and discipline emerges when open forums, or networked improvement communities form to integrate multi-sector requirements. For example, the Open Electronic Book Forum (OEBF) described in Section 8 includes traditional media publishers, electronic publishers, hardware manufacturers, software developers, and various other organizations, including disability organizations and access-technology providers. OEBF was formed with assistance from the National Institute on Standards and Technology (NIST). The purpose of OEBF is to create and establish XML standards for electronic book technology, and to promote this technology. Such open forums, guided by rules of fairness and transparency are charting a new course toward information sharing, including Federal information, that can flow more quickly, easily, and equitably to all people. Federal online service efforts should recognize and contribute to these association and standard- building activities. In this manner, uncoordinated partitioning approaches to public content that “dead-end” information flow can be reduced.

Promising service delivery technologies for both opening up information flow while structuring it for optimal use include: 1) expansion of the national abbreviated dialing services using spoken language interaction; 2) adoption of an open standard notation system [eXtensible Markup Language (XML)] for digital content that supports easy transport among Internet, phone, and a myriad of networked devices; and 3) Networked Improvement Communities combining Web collaboration space and face-to-face meetings in open forums that support deliberation and convening among stakeholders. In particular, the open forums are key to accelerating the structural social conventions needed to realize the “connection-making” potential of these converging capabilities. Without this open process, another generation of disconnected devices and data bases will be inevitable, based on marketplace history.

Governments, universities, and businesses that support the conditions for these forums to flourish, without trying to own and control them, will soon discover the innovation-diffusion power of this citizen-centric approach. Perhaps the by-product of the Internet—the heightened power to build meaningful and transparent public associations—remains today, as always, our core engine of economic growth.

## 4. Communication Tools for a Connected Society

Three promising Internet-based technologies will be introduced in this section and highlighted in subsequent sections of this guide: 1) Voice Application Networks 2) XML and 3) Networked Improvement Communities. Through sound stewardship from the emerging open forums over the next few years, these communication tools have the potential to dramatically extend the reach, quality, and usefulness of public information goods and services. Familiar and widely available information tools—including the telephone, radio, books, TV, and newspapers could be re-cast as transporting devices for accessible and up-to-date public content. This public information would be widely available due to open XML standards that make content inexpensive to render and authenticate in multiple forms. This blending of old and new technologies will gracefully minimize digital disparities, by increasing the use of structured information to simplify and unify connectivity among a myriad of transporting devices. This approach will ease dependence on partitioning designs that force device obsolescence through versioning. Taken together, these tools will enable the government to more reliably reach and provide information to underserved groups as persons with disabilities, those who are over 50, or those who are functionally illiterate.

### Voice Application Networks

Voice Application Networks allow the same dynamic information interactions developed for the Internet to be provided by telephone. In response to a caller's spoken selection, up-to-date information is presented in a natural sounding voice.

An example is Utah's new Traveler Advisory Telephone and Internet system, developed in preparation for the 2002 Olympics. The service will integrate information on weather-related road conditions, accidents, congestion, and construction activities into one system. The same information is available by web site and an interactive voice recognition telephone system. The dynamic information structure capability of XML makes it possible for current information to be continuously distributed in real-time to both services. Those unfamiliar with the Internet or simply traveling by car can call the 511 abbreviated dialing code. Using a natural sounding voice, the Traveler Advisory service prompts the caller with questions. Callers respond by natural speech to the prompts and are provided the information requested. This approach mitigates the effects of digital disparities by providing the same information through the old familiar channel of the telephone and the newer, less widely available Internet.

Voice Application Networks are maturing in power and popular appeal just in time to be effectively used by localities that are expanding the National N11 abbreviated dialing services. Today, 411 business directory services and 911 emergency services are most widely used by the general public. Soon more N11 numbers will become equally known and available (see Appendix B). This nationwide dialing system allows telephone users to connect with standard service gateways throughout the country by dialing only three digits. Below is an example of the 311 Non-Emergency Government Services directory:

The City of Hampton, VA opened its 311 call center in September of 1999 to provide city residents with 24-hour-a-day, seven day a week access to city services and information, ranging from reporting missed trash collection to answering questions about the city budget.<sup>3</sup> The service has been very well received, and public satisfaction with the service has been extremely high, with the call center receiving an average of 600 calls a day (May 2000).<sup>4</sup>

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<sup>3</sup> <http://www.innovations.havard.edu/Semifinalists/2001/2001mgmtandgov.htm>

<sup>4</sup> <http://www.vml.org/VTC/VTC3509-3.html>

A likely next step would be along the path that the state of Utah has taken: Employing XML and a Voice Application Network would enable the majority of routine requests (including rapidly changing or time sensitive information) to be provided through both a web site and an interactive voice recognition telephone systems. Through a simplified and unified system, citizens gain a measure of independence in how they choose to interact with the City's information services. By supporting three channels of communication (web, interactive phone, and call agent) the City benefits not only from greater service reach, but also greater scalability (handling more requests) without sky-rocketing costs.

### eXtensible Markup Language (XML)

XML is a notation system for building up the value of information intended to be shared. This value boost occurs when XML is employed to represent the underlying structure and meaning of information in an open and mutually agreed upon manner. This markup language and its variants (e.g., VoiceXML and Wireless Markup Language) are derived from the markup language (SGML) used by electronic publishers. XML can reduce the burden of managing multiple sources of data. The value of information with XML tags is increased because the information can be re-used and re-purposed easily. Multiple databases can be updated in a distributed fashion, resulting in lower maintenance costs. Information becomes more valuable and complete because it is derived from multiple data sources that enable a composite view previously unattainable. Data is maintainable and shareable through multiple channels, whether it is accessed directly by the public or indirectly through state or local governments who receive and then publish the information to their own jurisdictions. The state of Utah example described above illustrates the potential of XML.

The Michigan state legislature converted its compiled law to XML, which makes it easier to offer the documents online in multiple formats (HTML and PDF formats). This action not only helped state agencies to improve the production and management of their legislative process, but also enables the public to access documents without the need for a legal researcher. At some point, the public will be able to see the relationship between legislative actions and results of those actions expressed in government records. Visitors can draw from different sources to build their own customized output documents. More than 6,000 people use the system every day, with more than 43 million hits since the system was launched two years ago.

The National Archives and Records Administration and the Government Printing Office (GPO) are moving from SGML to XML. XML offers more tools and web renderings. XML enables applications to: 1) mediate between two disparate databases; 2) present different views of the same data to different users; and 3) support intelligent agents that tailor information discovery processes to the needs of individual users. Agencies that submit documents to GPO receive a 35 percent discount for delivering text that has already been marked up in XML. XML supports the philosophy that data "belongs" to its creators, and distribution channels are best served by a data format that does not bind the content to a particular vendor's tools or platform.

An important story on how XML is being employed to create Digital Talking Books is highlighted in Section 8.

### Networked Improvement Communities

Collaborative workspaces, which combine the functionality of Internet chat rooms with the document-storage capabilities of a knowledge management system allow for the creation of more meaningful partnerships, among state and local providers of government services, community groups, businesses, non-profits, and the public.

Businesses are the most sophisticated users of networked improvement communities, which are important tools to manage customer and partner relationships. A good example is the Open Electronic Book Forum (OEBF) described in Section 8. OEBF includes traditional media publishers, electronic publishers, hardware manufacturers, software developers, and various other organizations, including disability organizations and access-technology providers. The purpose of OEBF is to create and establish XML standards for electronic book technology, and to promote this technology. OEBF books produced by any publisher will be readable on any manufacturer's OEBF-compliant device. The agreements necessary for cross-platform compatibility are critical to success. All partners know that multiple approaches taken independent of one another will result in market failure.

A recent successful government application of the Networked Improvement Community approach was the Environmental Protection Agency's (EPA) Online Dialogue held in July, 2001. The Online Dialogue was directed at certain groups, including consumers, environmental and advocacy groups, and minorities. EPA used the online dialogue, which attracted 1,200 users, to gather comments on EPA's draft public involvement policy. The dialogue was structured in a manner similar to an in-person meeting, starting each morning with an online posting of the daily topic, an introduction, and comments made by a panel of experts. Approximately 100 to 200 messages were received each day, subsequently summarized, and then sent to all of the participants. While the dialogue did not replace the traditional Federal Register publication and respective comment period, it did allow EPA another venue in which to gather and share stakeholder comments.

Another successful application of the Networked Improvement Community approach is Earth's 911. Earth's 911 has received more than 70 awards, including the 2001 Stockholm Challenge Award. Earth's 911 is a nationwide public and private sector partnership providing citizen centric environmental information in every community in the nation. Earth's 911 has networked government information, in collaboration with EPA, from 50 states, 3300 counties and thousands of cities. Earth's 911 can be accessed at Earth's 911 or bilingual phone at 1-800-Cleanup. Citizens are empowered by XML-based information organized by zip code and available by web or phone.

Three promising Internet-based technologies have been introduced. They offer the potential for improving the quality of interaction between citizens and government generally. The remaining sections of this guide will introduce the addressable challenges posed by e-government initiatives in light of existing digital disparities and the potential role of these technologies to mitigate obstacles in the drive toward citizen-centric government.

## 5. Citizen-Connection Realities: Rising, but Uneven Access

As of August 2000, the percentage of American families with an Internet connection had risen to 41.5 percent of the population, with more than half of all households owning computers, and 116.5 million Americans had been on-line at some location. While it is predicted that by the time of this writing recognizable gains in Internet usage will be seen again and more than half of all Americans will be using the Internet, it is equally clear then that almost half of the American population will not have access to the Internet and the improved access to information that it brings.

According to a Government Accounting Office (GAO) study released in February 2001<sup>5</sup>, Internet users tend to have higher household incomes, and more education than the general U.S. population. For example, Internet users were more likely than the general population to be in a household with an income of \$35,000 or more per year. Internet users over the age of 24 were also significantly more likely to be college graduates or to have a graduate degree than the general population. Additionally, GAO's survey found that Internet users, compared with the general U.S. population, represented a higher percentage of whites and a lower percentage of African-Americans and Hispanics. Other demographic findings showed that the proportion of men and women online now mirror that of the general population, which suggests that women have caught up in their use of Internet technology.

These statistics bring to light the idea that the digital divide mirrors and magnifies divisions existing in society. The above trends are important for understanding the challenge that an unbalanced and partitioned society presents to our own country. The rapid growth of "islands of information distribution" that are not connected, yet play a dominant role in determining societal opportunities and access to vital knowledge, only exacerbates the social distance between those who can tap the electronic information flow and those who cannot. Societies cannot passively, but in effect "ex-communicate," individuals, allowing them to be separated from effective communication and interaction with their own community.

Well-structured public information service strategies can address citizen-connection factors by rendering information in open, authenticated formats. These simple and inexpensive content formats support both the Internet and the telephone, along with a myriad of networked devices. Public administrators have within their reach a means to transport vital public information easily and connect citizens to their government.

### Addressable Citizen-Connection Factors

This guide asks how e-government services today can mitigate the effects of digital disparities by accelerating innovative diffusion of public information products and services that can be shared widely at low cost. Quality interaction issues of accessibility, usability, and usefulness can be addressed. These issues cut across all of the categories described above. Three groups disproportionately affected are: Americans with disabilities, older people without work experience using computers, and people with English or technical literacy limitations, compounded at times by both cultural or geographic isolation and limited finances.

**Americans with disabilities** are only half as likely as the populations at large to have access to the Internet, ranking below any other category of people. While one quarter of Americans without a disability have never used the Internet, close to two-thirds of disabled Americans have not. The most serious barriers to computer and Internet use are currently associated with visual

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<sup>5</sup> "Telecommunications: Characteristics and Choices of Internet Users," U.S. General Accounting Office, February 2001, GAO-01-345.

impairment or manual dexterity problems. Deaf and hearing-impaired people have a much higher utilization rate, but are at risk to be left out if multi-media practices fail to offer visually presented text options for spoken information.

In terms of Internet use, the critical differentiator for **people over age 50** is current or previous workforce participation. Individuals who did not participate in the workforce had one of the lowest rates of Internet use at less than 17 percent. However, the statistic for workforce participants jumped to nearly 47 percent, still a smaller percentage than other groups.

**Functional reading literacy** represents a formidable challenge to millions of adults. It is already a central prerequisite in society. Only 4 percent of new jobs have minimum requirements that can be met by people with the lowest levels of literacy. Thirty percent of semiskilled and unskilled workers and almost 40 percent of minority youth are illiterate. Persons 25 years of age or older who dropped out of high school only have a slight (12.7 percent) chance of using the Internet as opposed to over three-quarters of adults with a college education. Although income is a factor, much of Internet content offers its greatest appeal to the community developing the content.

Communities need the opportunity to develop sufficient technical literacy in order to be co-developers of relevant content for their members. The measure of real success will be when people with different media preferences due to device availability, technology familiarity, or disability, will be able to easily manage how they receive content, including by standard telephone. Quality information that flows in this manner will allow individuals to obtain the community information needed for individual and public action.



## **6. Governments as “Media One” Catalyst**

The case can be made that if the vast quantities of information gathered and maintained by the government were delivered into the marketplace as knowledge products, the government would be the biggest media conglomerate in the world. XML-based protocols are beginning to open the channels for unparalleled information distribution among multiple media, both familiar and unfamiliar. This parallels the explosion in access made possible when the particular hardware and software combinations used to access the Internet hardly mattered anymore.

The media industry itself has struggled to both create and protect new kinds of media products that profitably exploit the intrinsic power of the Internet for micro-customization and delivery of content. While the media industry can remain successful in its mission without reaching all consumers, the government cannot. Because government differs in purpose and role from the private sector, it cannot fulfill its promise unless it reaches everyone. The cultural and community relevance of government information is a very difficult issue to tackle at the national level without partnerships. Promoting local input and shared control of information product development requires skills, resources and administrative mechanisms for national, regional, and local partnerships that are sometimes beyond the reach of federal agencies.

A review of 15 current Government Performance and Results Act (GPRA) performance plans revealed that existing GPRA departmental and programmatic goals are not focused on public information service goals. This does not mean that important work on public information services is not going on, all across the Federal government. On the contrary, word of mouth indicates that for many agencies, a great deal of work is in place and being developed, but perhaps difficult for local efforts to access. Similarly, there are aggregators of local innovations, but unlike the Centers for Disease Control or Cooperative Agriculture Extension Service, there is no common source or receiving point for current information on significant development and diffusion activities. Following are just several examples of content that community leaders consider relevant and useful:

- Local job listings, including jobs requiring entry-level skills.
- Local housing listings, including apartments with relatively low rents and homes in foreclosure.
- Community information about neighborhood events, services, developments, volunteer opportunities, places to go for family outings, and local schools.

Two examples will highlight the importance of the local need to combine databases in order to make local content useful. The Neighborhood Knowledge of Los Angeles has been operating for the past three years. DirectDisability.gov is getting underway now with sponsorship by the Department of Labor.

Neighborhood Knowledge of Los Angeles makes public information about Los Angeles' housing stock available. This information has been gathered from a variety of agency sources. By mapping the information to identifiable parcels throughout the city, along with training at the local Community Development Center, community development corporations, neighborhood groups, and private citizens can participate in neighborhood preservation and development efforts. By making previously inaccessible information readily available, people can make better business decisions and be better neighbors and citizens. Even multi-family housing inspectors with pen-based computers can track code violations as easily as Hertz cars and FedEx packages.

DisabilityDirect.gov is a project of the Department of Labor's Office of Disability Employment Policy and is associated with the Administration's New Freedom Initiative. It will be a portal to local information of interest to people with disabilities and their families such as federally funded transportation, job programs, and services in their hometowns. It will mirror, link, and extend model local and state sites that already provide this information through federal grants. Content control and approval will reside with authorized state, county, and local officials through a virtual private network. This loose coupling of well-structured XML-based information from multiple municipalities provides templates for easy replication among participating jurisdictions. Citizens and officials can easily make service comparisons across a state or region in order to provide momentum for continued improvements.

In the future, DisabilityDirect.gov could serve as an accountability measure for results being achieved from more block-grant decisions. Because the information will be using agreed-upon XML schemas, it can be dynamically interchangeable with a national 211 government information services gateway application. For example, an individual could find out when an accessible bus is due at his/her stop by entering a street address. This information would be available by the Internet or by phone, similar to the Utah Traveler Advisory Telephone and Internet system described in Section 4.

For the roughly half of the American public who currently do not have access to the Internet, similar opportunities exist. If creativity and discipline are applied by working with community and industry partners, government information can become readily available through multiple distribution modes, including existing means such as the standard telephone and newspapers. A central challenge is how to open up the design process so that the development circle includes not only technical experts, but local community leaders and ordinary citizens who can draw upon their diverse cultural and local knowledge to create information products that Americans care about. As collaborative partnerships form, more valuable information products will emerge that express both the technical flexibility of XML and the creative results that only arise from constructive tension of multiple views, unified by shared purpose.

## 7. Changing Citizen-Government Relationships: Partners in Innovation

A Neighborhood Knowledge effort like that of Los Angeles could add a Voice Applications Network to its existing XML-based repository and Web collaboration space. This simple addition multiplies the likelihood of universal access to every one. Providing this context-rich information through the National N11 gateway service as a local 211 or 311 (non-emergency government service) call, would support not only Los Angeles residents, but make it easier for other communities to learn about this innovation. Deaf persons including deaf persons who speak Spanish would be able to access this information through current National Telecommunications Relay Service available anywhere in the country by dialing 711. Even the project plan could be available in XML, making replication simple, with no need to re-invent the XML schema or acquire the database itself.

Such a solution addresses seven of the ten customer-centric dimensions that matter most to people as identified in Section 3: proximity, safety, utility, government, education, support and empowerment. The Web collaboration space would enable conversations on improvement activities on a city to city-basis, promoting the knowledge needed for community action. Networked Improvement Communities are technically scalable for multiple stakeholders at city or regional levels today, but are not yet common in practice.

This is the beginning of what citizen-centric government looks like from a “knowledge for community action” management perspective:

- **Responsive**—releasing the hidden value of existing information in a simple, powerful manner that is usable by all and led by local creativity and discipline to forge open “networked improvement forums” on behalf of the whole community.
- **Expansive**—creating the conditions that support local creativity and easy diffusion and adaptation to other interested communities throughout the country.
- **Reflective**—learning how to be catalyst and convener, but not controller of the information value chain.

### Locally Developed Innovations, Nationally Transportable Due to Standards

On a smaller scale, but similar in power and simplicity, is one of many initiatives of the Town of Blacksburg, Virginia. In 1998, the Blacksburg Electronic Village assisted the Voluntary Action Center to put its master list online. The master list contains about 250 social service and volunteer agencies that assist local social workers, church groups, and other volunteer agencies in matching people in need with the right organizations. The list was expensive to maintain, in high demand, and difficult to update. On-line it can be accessed and searched from any Web browser or printed as a hard copy. A personal digital assistant version is available for mobile workers while away from convenient Internet access. Imagine adding the Voice Application Network to this system. The circle of potential volunteers now expands to include people without web access who can work from their homes to augment busy call centers. With 211 and voice application network capability, more local people can find needed services with less effort, while non-local people can find out about the service and explore what parts of it they would like to see replicated in their community.

Today, people from more than 70,000 municipalities are driving on the roads every day, or waiting for public transportation services, as they search from office to office to find and conduct

government business on behalf of families, friends, or themselves. Multiply the time, convenience, safety, air quality, and fuel-saving benefits that would accrue daily from all of the “scouting” trips that could be eliminated if people could easily conduct preliminary inquiries by phone and by the Internet

The Internet-based protocols that opened the channels for unparalleled information exchange among people globally are also being extended in many forward-looking settings to just help neighbors be neighbors again. Increasingly, information defines the structure of organizations and not the other way around. This is the transformative power that confounds current logic. The defining characteristic is interdependence across hierarchy, geography, institution, and level of government. Interdependence defies traditional management for which old telephone and document service strategies were well-suited, and requires us to think and work together in new ways. As the Internet shifts from presenting static information to providing dynamic and service-oriented applications, Federal agencies that connect to this power of improved service are creating a citizen-centric government. This partnership in innovation has the potential not only to improve effectiveness and efficiency of government service delivery, but also to enhance the very society that government upholds.

Citizen-centered government will be a powerful stimulus to user-centered design, automatically addressing a wider range of individual abilities, skills, requirements, and preferences in more settings. In fact, government's very success is measured in its ability to provide timely and useful information and services to all citizens. This will, in turn, simplify and unify the “islands of automation” where information is imprisoned by file types and software incompatibilities that prevent it from being interwoven when needed. The improved performance will be measured by increased service satisfaction expressed by people who now connect with one another in public business settings where previously they were stranded alone “on un-named street corners” because their preferences for devices and data could not be interwoven into the settings where they chose to interact. Good technical design eliminates isolation effects at all levels of data, devices, systems, individuals, and organizations.

Good organizational design also enables a balanced interdependence among government officials, citizens, associations, universities, and businesses in much the same way as our Cooperative Agricultural Extension Service formed the right balance over its 140-year history. The Extension Service is reported to be the world's most successful change agency. The agricultural revolution is the primary evidence of its success, with a dramatic increase in U.S. farm productivity in the decades following World War II. It is the most admired and copied institution around the world. Funds for extension services in the U.S. come from federal (40 percent), state (40 percent) and county government (20 percent) sources. The service model comprises an interdependent set of assumptions, principles, and organizational structures for diffusing results of agricultural research to farmers in the U.S.

The Cooperative Extension Service model offers a glimpse of the potential for a similar “Technology Infrastructure Extension Service” (TIES) that is informally appearing as separate community test beds and networked improvement communities begin to address local and regional problems through greater coordination of effort. In order to solve real problems, the circle of participation has widened, necessitating an infrastructure that supports mutual commitments for coordinated efforts.

Increasingly, new people from new settings and using new technologies are gathering to achieve the creativity demanded by complex problems.

Successful problem formulation and resolution can only be achieved if these teams can form easily and engage in effective communication and information exchange. When groups are stuck "continuously rigging the ship" because their tools don't talk, they fail. When a diversity of people with a diversity of networked information devices, can interact like pick-up jazz players, and make good "music," they will succeed.

This signifies that the right balance has been struck between 1) the social, technical, and notational elements that need to be "held in common"; and 2) those elements of the whole system that must remain open to infinite variation and interpretation. Finding this balance is also central to achieving both the open-source and proprietary advantage needed for a sustainable public electronic infrastructure. As methodologies for evaluation in community test beds mature, they should yield the highest returns achievable by the scientific method—a focused inquiry balanced by the right tension between creativity and discipline.

## **8. Citizens as Co-Producers: Reducing Content and Usability Barriers**

The final section of this guide provides a picture of the emerging Federal role as catalyst and convener in linking the islands of civic innovation now emerging in our communities and supporting the public information they need. It highlights the early formation of an open TIES model, similar to our current “world class” Cooperative Agricultural Extension Service, with a set of assumptions, principles, and organizational structures for diffusing the results of community test beds. This emerging catalyst role has the potential to equal and surpass in importance, the successful Federal leadership exhibited in establishing the Cooperative Agriculture Extension Service 140 years ago.

This section will reinforce how new association-building roles and relationships are enabling at-risk citizens, government, businesses, non-profits, and professional associations to work together in new ways. It will demonstrate how learning from seniors, people with disabilities, and people with limited English language and literacy skills can shape the direction of e-government activities in important areas, such as public health information.

It will also demonstrate how the potential of the three technologies highlighted throughout this guide can contribute significantly to extending the value of these innovation partnerships and in turn, the reach of public information:

- National N11 abbreviated gateway services using spoken language interaction;
- Digital content with XML tags; and
- Networked Improvement Communities combining Web collaboration space and face-to-face meetings.

The real-world examples for this unfolding scenario were presented and discussed at five Universal Access Expedition Workshops conducted between April and July 2001 at the National Science Foundation in Ballston, Virginia.

### **Part 1: Digital Talking Books Emerging from Open Forums**

It is estimated that by 2005, electronic book publishing will comprise 10 percent of all consumer book sales. This is based on the expectation of open XML-based standards—any book, anytime, anywhere, for anyone. Because of Internet communications and a light touch by the National Institute for Standards and Technology (NIST), two international groups—the Digital Audio-based Information SYstem (DAISY) Consortium and the Open Electronic Book Forum (OEBF)—along with the National Information Standards Organization (NISO) are now integrating specifications that reflect the best practices from the world of publishing with the best practices from blind readers navigating structured information. What began as independent efforts by researchers, librarians, computer scientists, and publishers, came together over a series of face-to-face meetings augmented by a collaborative Web space repository of drafts, agreements, and communications.

Today, only 10 percent of published books are available in formats that can be read by blind and vision-impaired individuals. Soon, a single product—employing a single electronic book format—will be the norm for e-books. E-books will be attractive and usable by all readers, whatever the readers’ preferred medium.

A potentially “divided digital e-book” world was avoided when an expanded circle of partners was able to see the value that each partner contributed, and recognize the lesser value of creating separate, non-interoperable products. This emerging “best practice” from the marketplace illustrates the importance of networked improvement communities to add in all relevant partners in order to simplify and unify an approach likely to yield the greatest market-based results.

The encoded content is independent of its rendering medium. It can be delivered over the Internet, or even over a touch-tone phone. It can be stored on CD-ROM or DVD for reading in inexpensive players as easy to operate as pocket radios. A DVD today can hold 400 pounds or 2 million pages of information. The encoded content can range from audio recordings of human narrators to quality, machine-generated speech. The player connected to a TV (including headsets, if desired) would present a reader with a controllable display of text, available in large fonts if desired, with each word highlighted as it is spoken. In this manner, it can also serve as a powerful adult reading tool, offering current magazines, newspapers, and books as content in the privacy of a home setting. Organizations focusing on reducing functional illiteracy may find the feature that highlights text as it is being spoken, a powerful aid in assisting adults who want to learn to read. This capability was designed to meet specifications for readers who are visually impaired or have learning disabilities.

The power of XML and networked improvement communities such as the Open Electronic Book Forum have laid the groundwork for preventing an architecturally unsound approach of incompatible formats and non-interoperable components to weaken the marketplace and squander the economic development opportunities of the many communities of developers and users who anticipate benefiting from e-book potential.

**Part 2: Ready the Power of the 4-H Extension Service to Transfer Innovations**  
The 4-H CyberSeniors/CyberTeens program is now getting ready to exploit e-book capabilities. This 4-H inter-generational and community partnerships is already described in the Administration’s record of accomplishments in the first 100 days. It represents another real world example of the growing role of networked improvement communities. Through this program, which originated in Maine, more than 3,500 seniors, throughout five northeastern states, have been taught how to use the Internet by high school students. The U.S. Department of Agriculture-sponsored 4-H Youth Technology Team in Virginia, the Arlington County Cooperative Extension Service, the Virginia Tech University, the National Retired Teachers Association (NRTA), and the American Association of Retired Persons (AARP) have now joined in to extend the program throughout the country. Retired teachers from the NRTA are preparing to mentor tech-savvy students as they teach the seniors.

Building upon success in bridging digital and generational divisions, a new Arlington County, Virginia setting for the program, presents the challenge of adapting the curriculum and outreach efforts to address a wide range of language literacy and cultural diversity issues. The 4-H CyberSeniors/CyberTeens program has the full support of the Arlington County Council and represents its most visible community partnership to address digital disparities.

Simultaneously, the 4-H CyberSeniors/CyberTeens program is formulating a CyberHealth Initiative. Health information is the topic of greatest interest to seniors using the Internet. The partners are beginning to team with the National Library of Medicine, the federal organization recognized as the premier provider of health information in the world and a model user of XML.

A number of medical research centers are also planning to participate. Longitudinal data on the relationship between health training and health behaviors is anticipated for as many as 50,000 seniors based on the current growth rate of the program.

In Arlington county, discussions with local community leaders are also focusing on what technologies, approaches and adaptations are needed to make to the proven curriculum used by English-speaking and -reading participants usable and effective for seniors and students from other linguistic backgrounds. The curriculum has just been translated into Spanish. An upcoming Universal Access Expedition Workshop will include guest contributors on the following subjects: digital talking books, national N11gateway services using spoken language interaction, linguistic and cultural competence for minority health care, and security issues for patient health care information.

All participants realize that thousands of community settings within easy communications reach of the 4-H Extension Service and the NRTA networks will soon be learning from and building on the efforts of the pioneering multi-lingual, cyber-health initiatives being explored in Arlington County today.

### Part 3: Seniors as Co-Producers: Reducing Content and Usability Barriers

It is not difficult to imagine five years from now that a cadre of healthier seniors are not only spokespersons for the health and social benefits of this program but also informed cyber-citizens, willing and able to serve as information society stewards in their own communities. This has already occurred in Blacksburg, Virginia where seniors are some of the most enthusiastic participants of the Blacksburg Electronic Village. Their web site is one of the most active in town and they are recognized as early innovators, willing to try new things.

With 40 percent of health care costs attributable to the management of information, engaged seniors brought into the digital age by neighborhood teens can provide ongoing, credible insights to improvements aimed at spanning breakdowns in knowledge management for health care information and patient records. As citizen stewards, they could help mitigate the risks of finding more economical solutions that balance the transport of XML-based medical records on the Internet with the safeguards of privacy and security that the public expects. This will likely happen in the "Digital Dividends Extension Service" forums that will continue to form in response to local and regional needs.

It can be imagined that these networked improvement communities, in a manner similar to the Cooperative Agricultural Extension Service, will tap federal, state, and local infrastructure resources while serving as community testbeds for e-books evolving from the Open Electronic Book Forum described in part 1 of this section. These open forums will be characterized by transparency and openness enabling them to be applied to a variety of digital society and enterprise sustainability issues. The results of the forums will likely improve markedly as the civic-centric goal of the Administration in 2001 raises the sights of forum members to continue to add a greater range of different perspectives and views. It is likely that community leaders from previously underserved and undervalued market segments (including people with disabilities, seniors, and immigrants from diverse cultural and linguistic backgrounds) will contribute bold and fresh insights that lead to better risk mitigation, credible commitments, and foresight in business decisions. Such contributions will be invaluable in improving service delivery, not only in local communities, but also in the global marketplace.



## 9. Conclusion

A new citizen-centric perspective is emerging as a driver to bridge the “islands of automation” that today partition and limit the government’s ability to make information and services accessible to citizens. This citizen-centric perspective suggests that by learning from and valuing the market experience of people who are most vulnerable in society, we will have a better litmus test to identify emerging technologies with the greatest potential for building a robust and sustainable civic infrastructure. In order for whole communities to succeed in the future, they must become interdependent upon shared communications and information processes that accommodate broad differences among all their members and among other communities. When societal technologies are insufficiently flexible to accommodate connection-making activities among all their members, the whole of society is adversely affected. Today, effective stewardship of an XML-based architecture holds great promise for reducing the barriers to widespread innovation made possible by public information service strategies that are results-oriented, market-based, and citizen-centered.

As accommodating difference becomes the new competitive marketplace strategy, government’s catalytic role in the formation of networked improvement communities is strategic and mirrors the role of the Cooperative Agricultural Extension Service as “world class” change agent for a previous societal revolution, the agricultural revolution. Members of society can now become engaged, frontier co-developers of the future forms and functions of societal technologies. Networked improvement communities, with transparent Internet records for accountability, are becoming the new frontier innovation places that thrive within the creative tension between social capital and individual capital creation. This is where the best innovations emerge. Innovations from engaged citizens in frontier improvement outposts move from the edge to the center of society the most rapidly.

This social risk management approach effectively accommodates and augments the differences that really matter to societies and keeps them in balance as the solid ground of shared understanding sometimes “quakes under their feet” from the shifting tension of competing futures. As the national citizen-centric agenda aligns e-government with civil rights and intellectual property rights, previously hidden advantages are appearing. Providing choice in the mode of information representation is breaking down barriers to interaction and communication far beyond benefits that would otherwise accrue to any one company, community, industry sector or socio-economic group.

### The Potential for Broad Benefits is Within Our Sights...

*Maria Sanchez, a recently arrived immigrant from Guatemala, is in trouble. She has had a low-grade fever for a week that shows no sign of abating, and her hands and feet are swelling. She thinks she may be pregnant. She does not know what to do. Maria makes a tenuous living as a household domestic, so she can’t afford a doctor. Because she is not a legal resident, she is afraid to seek government assistance.*

*On the way home from Sunday mass, Maria picks up a free copy of the local Spanish language newspaper and a notice catches her attention. Promising confidential help for recent immigrants, it lists a telephone number. After thinking it over for a couple of days she goes to a phone booth and dials the number.*

*A computer voice asks her in Spanish if she wants to speak Spanish. “Si,” she replies and the voice asks her to speak her zip code. “Dos, dos, dos, uno, cuatro,” she answers. The voice*

*continues in Spanish, "Are you in Fairfax County, Virginia?" "Si." Although the voice on the phone is computerized, it seems quite natural and is comforting.*

*Maria is given a brief list of services to choose from. To select a service she simply needs to speak its name. "Health." "...brought to you by your local pharmacy." replies the system. She is informed that there are two clinics nearby to which she can go for assistance, and one pharmacy. She can also be turned over to an operator to make an appointment at that moment if she would like. Maria declines, but accepts an offer to learn about more local services. The system tells her that there are lay social workers at the nearby St. Ignatius church—her parish.*

*The next evening Maria visits St. Ignatius and meets Luz Alcantara, a St. Ignatius parishioner involved in the church's community ministry program. Luz invites Maria into her office and listens to her problems. While Maria talks, Luz enters information into her computer using a Web site designed for use by lay social service intermediaries and developed jointly by the county government and a local paper. By entering in the key elements of Maria's case, Luz is presented with care options and is prompted to ask Maria other questions about her case.*

*A new strain of staph infection has been reported by the county public health office, the symptoms of which match Maria's. A map appears on Luz's screen showing the locations of the reported cases. The incident clusters overlap Maria's neighborhood. Based on Maria's demographic profile, the system also prompts Luz to ask about other possible health issues, including the possible pregnancy that Maria, embarrassed, admits to. Luz urges Maria to set up a clinic appointment at once, which they do together.*

*The system also provides links to local food banks, job referral agencies, English language training, and housing referral agencies—all resources available within two miles of Maria's home. Luz prints out the information, which is also presented in map form, and hands it to Maria. Luz takes Maria's hand on her way out the door and says, "I'll look for you in mass next Sunday."*

*When Maria is gone Luz picks up the phone and calls the county public health office to discuss the case. Darrel Washington listens carefully and confirms that Luz has taken the correct action. "We're learning a lot about the infection pathways on this disease," he says. "Your help in referring cases is making a real contribution to getting it under control. We're seeing a much faster drop-off in cases this year than before we launched the digital community health adviser project."*

## Appendix A: How To Move Forward

### Additional Resources

If after reading this guide, you wish to improve the way your agency and/or program delivers information to citizens, customers, and stakeholders, here are a number of useful resources focusing on the relevant communities of practice: electronic government, communications, and partnerships for innovation. Needless to say, you will have to run the hurdles associated with government procurement; we've included a checklist.

#### *Civic Society Initiatives Toward Electronic Government*

The Council for Excellence in Government (<http://www.excelgov.org/>) has published a blueprint entitled "E-Government, the next American Revolution" that can be viewed or downloaded at <http://www.excelgov.org/techcon/egovex/ebprint.htm>. The Council brought together leaders from both government and industry in the preparation of this report. Sharon Dawes and her Center for Technology in Government at SUNY/Albany has been at the forefront of e-government for years. The Center's website is <http://www.ctg.albany.edu/>, and <http://www.ctg.albany.edu/egov/results.html> will bring you to articles, reports, and guidebooks from "E-Government: Creating Tools of the Trade" from her applied research program. The Ford Innovations program is explained at [www.innovations.harvard.edu](http://www.innovations.harvard.edu).

#### *The Communications Community Guides the Civic Dialogue*

The seminal work done by Everett M. Rogers, author of *The Diffusion of Innovation* brought us the concepts of "radical innovator" and "early adopter," but little in-depth understanding of his insights. An outline of the book can be found at <http://www.personal.psu.edu/staff/j/1/jll191/knowledgebase/innovation/rogers.htm>. Opening communications is the simplest first step in understanding the mental models and stances among stakeholders and customers that pull an organization forward or hold it back. The Federal Communicators Network was started in 1996, and has 800 members on its listserv, and reaches another 2000 people. FCN can be reached at <http://www.fcn.gov>.

#### *The Federal Information Technology Community Joins In*

The Federal Chief Information Officers (CIO) Council has been laying the foundation for the coordinated introduction of e-government products and services. The CIO Council website is at <http://www.cio.gov/>.

This guide is the work of the Universal Access Working Group chartered under the Council's Federal Architecture and Infrastructure Committee (FAIC) Committee. The Universal Access Expedition Workshop notes are at [www.ncsa.coracle.edu](http://www.ncsa.coracle.edu).

The FAIC website that supports government progress in XML is at <http://www.xml.gov/>. The FAIC website that supports knowledge management is at <http://www.km.gov>. The CIO Council also supports Firstgov, the portal to online Federal information and services and increasingly state and local governments as well: [www.firstgov.gov](http://www.firstgov.gov). The Council also supports the Section 508 Executive Steering Group. Details of this significant Federal IT Accessibility Initiative are at <http://www.section508.gov/>.

#### *The Federal Information Management Community Adds Established Structures for Lasting Value*

There is a continuing need to extend to all government information the information content management disciplines that govern the operations of the National Technical Information

Service, the Government Printing Office, the National Archives and Records Administration, the Library of Congress, and the Federal Depository Libraries.

<http://www.nclis.gov/govt/assess/>

#### *Other*

The news community (print and broadcast) is following developments in XML at

<http://www.xmlnews.org>. The World Wide Web Consortium has a website at

<http://www.w3.org>. They track XML developments at [www.w3.org/xml](http://www.w3.org/xml).

The International Center for Disability Resources on the Internet can be found at

<http://www.icdri.org>. Government Executive magazine has been tracking the implementation

of the Government Performance and Results Act at <http://www.govexec.com/gpra>. Federal

employees and agencies interested in customer service can find out more at

<http://www.customerservice.gov>.

#### *Government Procurement*

The Office of Federal Procurement Policy (OFPP) in OMB maintains an acquisition reform

network that is captured at <http://www.arnet.gov>.

### Creating Conditions for Future Public Goods and Services You Care About— Checklist

- ☑ Be sure that your staff is current with the resources listed above, and working with OMB and the CIO Council on the coordinated e-government blueprint formulated by the Administration. This will assure that you are at “the leading edge, not the bleeding edge” of the hard and soft technologies and unified metadata efforts.
- ☑ Try to improve, not replace, existing information dissemination efforts. In fact, celebrate their successes. As Machiavelli said, “the innovator has for enemies all those who have done well under the old conditions, and lukewarm defenders in those who may do well under the new.” During market research, turn to the associations and pilot initiatives identified in this guide, particularly associations with the expertise to evaluate the competing 508 approaches.
- ☑ Take the time to be sure that your Congressional committees, your political leadership, your budget office and your CIO are on board.
- ☑ Work out the approval, acquisition, development, and implementation schedules that will make your project a success.
- ☑ Check-in, early and often, with your CIO’s office and your XML Working Group representative. This will help keep you in step with the Federal IT Architecture plan, reducing your risk of a closed solution that stagnates the flow of information to its intended settings, jeopardizing usefulness.
- ☑ Consider using formal project management tracking systems to meet your deadlines. Almost all contractors do, but too few government agencies have invested the time and staff needed. See <http://www.pmi.org>.

- ☑ Focus on making visible the requirements of the underserved groups identified in this guide, is the most important source of power you have to validate and reward true federal marketplace innovations that uniquely matter to citizens.
- ☑ If you can get your project integrated into your agency's GPRA goals, and if you measure success in part by using the American Customer Service Index system, you will have more high level support. Follow the sound recommendation of the US National Commission on Libraries and Information Science to render GPRA data elements in XML.
- ☑ Finally, never forget the Law of Contracting: "Good, cheap, fast—you can have any two you want." Patience is always a virtue.

## Appendix B: Voice Application Networks

Voice Application Networks (VANs) represent an important new tool for government to use to reach many of the groups currently underserved by government goods and services. This new generation of telephone technology allows users to access spoken information VoiceXML via existing telephone lines and equipment using voice-activated applications. The new applications are based on VoiceXML, and deliver the required information through a combination of programmable interactive voice response (IVR) and speech recognition. The same information provided on a web site can be navigated by voice using the telephone, provided that the file structure is XML. Advancements in this technology means that the voices that callers hear over the telephone are quite natural sounding and easy to interact with. In addition, advances in voice acoustics analysis have allowed providers to build highly sensitive recognition models that are able to account for such things as regional accents and dialects. As shown earlier and again below, there exist several good examples of its use in government today, especially in the 511 (traffic conditions) abbreviated dialing arena. With telephone penetration at near 100% this enhancement has the potential to readily reach underserved groups due to familiarity, availability and usability by people with limited print literacy or technology literacy.

### N11 Speed Dialing for Help and Services

N11, also known as abbreviated dialing, is the nation-wide dialing system that allows telephone users to connect with service gateways throughout the country by dialing only three digits. The N11 coding scheme was developed and extended based on research that indicated a substantially higher rate of use of three digit codes among telephone subscribers than of traditional seven-digit numbers, even when those numbers were the same throughout (example: 333-3333).

The current status of the eight N11 codes are as follows:

- 211: Assigned for community information and referral services
- 311: Assigned nationwide for non-emergency police and other government services
- 411: Unassigned, but used virtually nationwide by carriers for directory assistance
- 511: Assigned for traffic and transportation information
- 611: Unassigned, but used broadly by carriers for repair service
- 711: Assigned nationwide for access to Telecommunications Relay Services
- 811: Unassigned, but used by local exchanged carriers for business office use
- 911: Unassigned, but used nationwide for emergency services

### Digital Divide Potential

The implementation work being done around the country on the N11 services shows how needed content can be provided to individuals who do not have access to computer equipment, but can use telephones effectively. This approach also addresses access problems of mobile users. The use of 711 today greatly extends the ease of communications between individuals with and without hearing or speech limitations. There is great potential in this technology for closing the digital divide, and government program managers need to make themselves aware of the possibilities for structuring public information resources for use through service gateways or through interactive voice recognition or navigation systems.

#### *City of Hampton, VA*

Two examples of the successful use of the N11 technology are Hampton, VA and Atlanta, GA. The City of Hampton, VA opened its 311 call center in September of 1999, to provide city residents with 24 hour a day, seven day a week access to city services and information, ranging

from reporting missed trash collection to answering questions about the city budget.<sup>6</sup> The service has been very well received, and public satisfaction with the service has been extremely high, with the call center receiving an average of 600 calls a day (May 2000).<sup>7</sup>

*United Way of Atlanta, GA*

The N11 technology has also been successfully employed in Atlanta, GA, since 1997 when the United Way created a 211 referral service. The 211 service provides a free 24-hour telephone information and referral line staffed by trained referral agents who connect callers to a database of more than 2000 resources. Through this service, callers are matched with social services, volunteer opportunities, donations opportunities, and civic and neighborhood organizations. Prior to operating the 211 referral service, United Way of Atlanta offered a similar service using the standard 7-digit calling number called First Call for Help. Since switching to the 3-digit abbreviated calling number and expanding service, call volume has increased by more than 300 percent.

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<sup>6</sup> <http://www.innovations.havard.edu/Semifinalists/2001/2001mgmtandgov.htm>

<sup>7</sup> <http://www.vml.org/VTC/VTC3509-3.html>

## Appendix C: XML

eXtensible Markup Language (XML)<sup>8</sup> is the starting point for many of the Internet- and voice-based technologies that can be used to improve access to government goods and services and therefore can alleviate many of the barriers to receipt of government information associated with digital disparities. XML itself is a promising notation system for representing the underlying structure and meaning of electronic information, whether it be data, text, or sound.. This system, and its variants (e.g., VoiceXML and Wireless Markup Language), can play an important role in providing goods and services directly to the public through telephone based services with speech recognition or text-based materials on the Internet.

XML functions by employing markers, or tags, that accompany the electronic data in agreed upon ways. These tags, and the structures that govern them, mean that XML can simplify and unify the sources of data to reduce the burden of managing multiple sources of data. These same characteristics allow information to be reused, databases to be consolidated, and disparate data bases to be accessed resulting in lower maintenance and usage costs. Data that is managed once can then be accessed through multiple channels, whether it is shared directly with the public by the Federal government or is shared with a state or local government who then publish the information.

eXtensible Markup Language (XML) goes beyond the presentation descriptions for formatting, linking, and display options offered by HTML. XML enables flexible operations on content originating from a variety of different operating platforms and applications. To an organization, good use of XML in a sound enterprise architecture enables the “law of diminishing costs per information unit.” It permits scaling up operations to meet growing information exchange needs with disparate partners on a scale not previously imaginable, where benefits vastly outweigh additional per unit costs. XML could describe all the relevant documents, services, and organizations involved in a national integrated services program. As data becomes independent from its source program through XML, information is no longer imprisoned by file types and software incompatibilities that prevent it from being interwoven when needed.

Many industries and scientific disciplines are already using XML to exchange information across platforms and applications. Because XML separates data from presentation, XML users can extract only the data needed. The implications are enormous for massive manuals, project schedules, etc. on the web that would be overwhelmingly complex, if the specific information needed couldn't be extracted quickly and easily. XML could be used to describe all the objects, services, documents and organizations needed to complete a project. Previously, information exchange among systems was difficult, because unlike ASCII, fundamentally different forms of data representation were employed.

Federal agencies that want to take full advantage of XML and its data reuse and re-purposing capabilities, must first establish a “vocabulary” for the information to be shared, and then organize that vocabulary in an approved manner. Several national and international organizations have evolved to facilitate the efficient use of XML data.<sup>9</sup> These organizations and the standards that have been established ensure that the information managed in an XML format bears the increasingly important characteristics and attributes of a well-formed record:

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<sup>8</sup> Technical background information on XML may be found in the references section. In addition, WWW.XML.gov hosts the latest efforts of the XML Working Group whose charge is to accelerate, facilitate and catalyze the effective and appropriate implementation of XML technology in the information systems and planning of the Federal Government.

<sup>9</sup> See [WWW.XML.gov](http://WWW.XML.gov) and [WWW.W3.org](http://WWW.W3.org) for more information on XML standards.



reliability, authenticity, integrity, and usability.<sup>10</sup> Complying with these standards when implementing XML-based solutions will assist Federal agencies in not only in sharing information more efficiently but also in promoting the sharing of quality information.

## Some Government Examples

### *National Library of Medicine*

As part of the National Library of Medicine's (NLM) project to modernize its computer systems, NLM has chosen XML as the new tagged format for disseminating the bibliographic citation data associated with MEDLINE, its premier bibliographic database of medical science information. This decision strengthens NLM's commitment to distribute its journal citation data in a format that is widely described and, therefore, familiar to many in the information industry, especially in the Internet Web environment.

Choosing XML as the data format was a natural extension of NLM's use of XML to receive bibliographic data electronically from publishers because of XML's ability to support other character sets.. This was particularly important to NLM because XML supports the universal character sets used by the medical community to specify selected diacritical marks, an important consideration for the worldwide nature of MEDLINE data.

### *Securities and Exchange Commission*

The Securities and Exchange Commission (SEC) has developed a customized version of XML for use with EDGAR, the SEC's Web-enabled electronic information filing and data management system. The information filed in the EDGAR system is designed to contain only the minimal set of XML data needed by the server, thereby maximizing "Reduced Content Filing." The benefits of reduced content are two-fold, and can greatly enhance the effectiveness of the EDGAR system. First, the smaller files that result require less bandwidth for upload and, therefore, upload quicker. Second, the files can be processed and filed more rapidly since all of the graphical content has been removed from the reduced file.

### *U.S. House of Representatives*

In a first step toward the use of XML to facilitate the reuse and repurposing of its legal documents, the U.S. House of Representatives, under the direction of the Senate Committee on Rules and Administration and the House Committee on Administration, the Secretary of State, and the Clerk of the House have worked together with the Library of Congress and the Government Printing Office to create Document Type Definition files (DTDs). The DTDs agreed upon by these groups determine the vocabularies that are specific to Congress. The XML vocabularies are important because they specify the definitions for Congress' data element as well as the data attributes for the terms that Congress uses in its work. The DTD also specifies how that vocabulary and the terms it contains can be used and how they relate to each other. This structure ensures that all parties who will use the data have the same understanding of the data. This process for setting up a data structure is similar to the metadata cataloguing (or tagging) of library books known as the Dewey Decimal System which has supported library collection management and resource discovery for decades.

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<sup>10</sup> The International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) host technical committees that collaborate in worldwide standardization efforts such as information technology. ISO/IEC 11179 describes how data elements should be documented. This documentation, when done well and managed in a Data Element Registry, simplifies data location and retrieval, even from disparate databases and makes it easier to send and receive data via electronic communications. The guidance on the formulation and maintenance of discrete data element descriptions and semantic content (metadata) supports users to ensure that they formulate data elements in a consistent, standard manner. It also provides guidance in establishing a data element registry, such as EPA's Environmental Data Registry (EDR), which catalogs EPA's information resources and provides a registry of standard data elements. The EDR vocabularies are designed to promote efficient sharing of environmental information among EPA, states, tribes, and other information trading partners.

## Appendix D: Networked Improvement Communities

Networked Improvement Communities that take advantage of Internet-based collaborative workspaces are one of the best approaches available to government program managers who are looking to create innovative e-government projects that will mitigate digital disparities. As noted in *E-Government Best Practices: An Implementation Manual*<sup>11</sup>, innovative e-government projects exhibit several common characteristics, including a focus on: public-private partnerships, alliances with stakeholders, interagency cooperation, and end-users. These characteristics, all of which show an openness to accommodating difference, are inherently citizen-centric, and fit naturally within the current e-government mandates.

Collaborative workspaces can play a successful role in fostering an end-user focus by providing government program managers with the networked improvement community space needed to build public-private partnerships and stakeholder alliances as well as to enhance interagency cooperation. Collaborative workspaces do this by combining the functionality of Internet chat rooms with the document storage capabilities of a knowledge management system. These spaces also allow the government to interact with a broader segment of the public, many of whom are currently the most underserved in terms of government goods and services. This interaction can help both entities by allowing the underserved to become partners in innovation with the government and help it identify new tools and technologies to provide greater access to information.

### Designing Networked Improvement Communities

Networked Improvement Communities can have real time communication between multiple participants over the Internet using collaborative workspace. While each collaborative workspace should be designed to meet the specific needs of the group that it will support, there are elements common to many collaborative spaces<sup>12</sup>, these include:

- An Internet home page,
- An on-line discussion space,
- An area for posting questions,
- A list of contacts,
- A knowledge management system for document storage, and
- Shared space for simultaneous collaboration or virtual meetings.

Depending upon the needs of users, technology may be used to allow users joint access to specific files within each user's hard drive. In this way, documents can be reviewed and edited as a team, although individual users may be miles apart from each other. Logins and passwords are used in many of these spaces to ensure secure access to the designated workspace, and new users can be introduced into the workspace by receiving a personal invitation and login information from an existing user. Users may create multiple workspaces to address a variety of

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<sup>11</sup> Prof. David Darcy, *E-Government Best Practices: An Implementation Manual*, a study commissioned by GSA, May 2001, [http://egov.gov/professional\\_development.htm](http://egov.gov/professional_development.htm).

<sup>12</sup> Etienne Wegner, *Supporting Communities of Practice, A survey of Community-Oriented Technologies*, Draft Version 1.3, March 2001, found at <http://www.ewenger.com/tech>.

topics or to communicate with a specific set of participants. Users can also use a shared calendar and discussion space.

### Networked Improvement Communities Have Many Benefits

The use of collaborative workspaces for networked improvement communities is beneficial to both government and business. From a practical standpoint, collaborative workspaces can help organizations reduce travel expenses while allowing high quality communication between on-site employees and telecommuters or traveling employees. Business meetings can be made more efficient with the inclusion of participants from around the world, while encouraging the free exchange of information and ideas from any number of participants in real time. Most importantly, collaborative workspaces offer the government an opportunity to interact with stakeholders who for a variety of reasons might not be able to share their experiences or expertise with the government in a traditional meeting setting.

One of GSA's efforts in this area is the Accessibility Forum launched in May 2001. The forum is an ongoing collaboration among stakeholders affected by Section 508 including user, industry, government and other communities in order to benefit employees and members of the public with disabilities. Participants come from over 80 organizations that include electronic and information technology industry, assistive technology industry, industry advocacy groups, advocacy associations for people with disabilities, academic, research, and standards groups, and government procurement and information technology representatives. The Forum will identify, prioritize and conduct projects that assist government in making informed decisions about Section 508 related procurement, and allow government, industry, and users to communicate and highlight areas where further effort is needed." More information about the Accessibility Forum is at <http://www.accessibilityforum.org/>

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